

Pursuing Cleaner Energy: Consumption and Production

The following are positions of the New Jersey Department of Agriculture's Renewable Energy Strategy and the rationales behind those positions.

Position: Renewable fuels must be aggressively pursued, as the supply of fossil fuels is finite and the geopolitical costs of obtaining them are escalating. Delaying the pursuit of alternative fuels will only exacerbate the current surge in fossil fuel prices.

Rationale: *Studies over the past five years have produced varied estimates of when the world will reach peak oil production, after which a steady decline in production would occur. However, the projections in studies over the past five years place peak production at no later than 2037 and as early as 2008.²*

Position: Alternative fuels are the best short-term solution to rising liquid fuel prices that will result from the peaking of oil production.

Rationale: *Unless action is taken soon, massive oil shortages, along with large price increases, will develop, creating a long period of worldwide economic hardship. Decades will pass before fully electric cars will achieve significant market share. Additionally, no technology has been envisioned for powering heavy trucks or airplanes with electricity.³*

Position: The current supply of oil can be stretched through the use of gasoline additives that also provide the "oxygenate" benefit of a cleaner-burning fuel. The oxygenate currently in use in New Jersey's is MTBE (methyl tertiary butyl ether), a byproduct of the oil refining process. Nearby states such as New York and Connecticut have banned or phased out the use of MTBE because it has been shown to contaminate groundwater.

Rationale: *Because MTBE contains a tertiary carbon bond, microbes cannot break it down, accounting for its detection as a groundwater contaminant. While 20 parts per billion is the Environmental Protection Agency safety limit, as little as a few drops in an Olympic-size swimming pool filled with pure water have been shown to render the water undrinkable.⁴*

² U.S. Department of Energy; "Peaking of World Oil Production: Impacts, Mitigation and Risk Management"; Hirsch, R. L., Bezdek, R.H., Wendling, R.M. February, 2005.

³ Ibid.

⁴ New Jersey Conference of Mayors report, Winter 2004, <http://www.njmayornet.com/BlecherWin04.htm>

Position: The risk of MTBE getting into groundwater is too high to ignore, considering its ability to give water a turpentine taste and smell at even very low levels and its status as a suspected carcinogen.

Rationale: *In a five-year (1993-98) study of 2,110 community water systems in the Northeast and Mid-Atlantic states, MTBE was the second-most frequently detected Volatile Organic Compound (VOC) behind only the trihalomethane (THM) compounds. MTBE was detected in concentrations from 0.2 parts per billion to 210 parts per billion in 343 drinking-water samples from 106 water systems. The detection of MTBE was five times more likely to occur in water systems where it was used in substantial amounts in the oxygenated and reformulated fuels programs.*⁵

Position: The results or preliminary tests on the health effects of MTBE underscore the dangers of inhaling or ingesting MTBE. In light of the availability of an alternative, ethanol, which provides comparable air-cleaning ability without the risks of groundwater contamination, pursuing ethanol production as a replacement for MTBE is preferable to relying on MTBE.

Rationale: *When research animals inhaled high concentrations of MTBE, some developed cancers or experienced other non-cancerous health effects. EPA's Office of Water has concluded that available data are not adequate to estimate the potential health risks of MTBE at low exposure levels in drinking water but that the data support the conclusion that MTBE is a potential human carcinogen at high doses.*⁶

Position: Remedial steps to remove MTBE from drinking water sources are highly expensive, requiring costly filters and upgrades to aeration systems that must run for years to ensure they are effective. Continued use of MTBE as an oxygenate in gasoline will only prolong chances of exposure to groundwater, thereby increasing the cost of any necessary cleanup. A bill pending in the New Jersey Legislature to phase out MTBE should be passed to avoid such problems or at least reduce their impact.

Rationale: *Water treatment costs for removing MTBE are 40 percent to 100 percent higher than the costs of removing other pollutants. For instance, the cost to remediate a site where gasoline containing MTBE had contaminated groundwater were \$390,000, compared to \$280,000 for the same site if the gasoline had not contained MTBE.*

Position: As MTBE is phased out, New Jersey should increasingly rely on ethanol, an oxygenate that provides the same air-cleaning benefits as MTBE but avoids the water contamination problem.

⁵ "Occurrence and Distribution of Methyl *tert*-Butyl Ether and Other Volatile Organic Compounds in Drinking Water in the Northeast and Mid-Atlantic Regions of the United States, 1993-98"; Grady, S. and Casey, G. U.S. Geological Survey, 2001, <http://sd.water.usgs.gov/nawqa/pubs/wrir/wrir00.4228.pdf>

⁶ U.S. Environmental Protection Agency, "Drinking Water," accessed at www.epa.gov/mtbe/water.htm.

Rationale: In addition, use of a 10-percent ethanol-blended gasoline reduces carbon monoxide emissions by 25 to 30 percent, comparable to the air-cleaning qualities of MTBE without the similar risk of groundwater contamination since ethanol can be broken down by microbes.⁷

Position: Assertions that ethanol requires more energy to produce than it creates in return have been shown to be erroneous through federal studies. Combined with ethanol's effect in reducing reliance on foreign oil, this positive energy balance makes pursuing ethanol as an alternative fuel attractive.

Rationale: Ethanol made from corn has an energy ration estimated at anywhere from 1.34⁸ to 1.67⁹, meaning that for every Btu dedicated to producing ethanol, a 34-percent to 67-percent energy gain results. When comparing the amount of liquid fuels used in ethanol production to the energy output, the difference is even more stark. Corn ethanol production utilizes abundant domestic energy feedstocks such as coal and natural gas, with only about 17 percent of the energy used to produce it coming from liquid fuels such as gasoline or diesel. For every one Btu of liquid fuel used to produce ethanol, there is a 6.43¹⁰ Btu gain.

Position: The phase-out of MTBE and its replacement with ethanol should not result in price increases of gasoline, based on the experiences of states that already have implemented the switch.

Rationale: The supply and infrastructure challenges to implement the New York and Connecticut MTBE bans have been successfully met by the petroleum and ethanol industries. MTBE ban-induced price increases have not been reported by (the U.S. Energy Information Administration), New York or Connecticut who are monitoring prices. California energy officials report a similar experience in meeting their January 2004 MTBE ban.¹¹

⁷ Canadian Renewable Fuels Association, <http://www.greenfuels.org/>

⁸ "The Energy Balance of Corn Ethanol: An Update" Shapouri, H., Duffield, J., Wang, M. U.S. Department of Agriculture, Office of the Chief Economist, Office of Energy Policy and New Uses, AER No. 814, <http://www.usda.gov/oce/oepnu/aer-814.pdf>

⁹ "The 2001 Net Energy Balance of Corn-Ethanol" Shapouri, H. U.S. Department of Agriculture, Office of the Chief Economist, 2003, <http://www.cleanairchoice.org/outdoor/PDF/USDA%20Energy%20Balance.PDF>

¹⁰ "The Energy Balance of Corn Ethanol: An Update" Shapouri, H., Duffield, J., Wang, M. U.S. Department of Agriculture, Office of the Chief Economist, Office of Energy Policy and New Uses. AER No. 814, <http://www.usda.gov/oce/oepnu/aer-814.pdf>

¹¹ Coalition of Northeastern Governors (CONEG) Policy Research Center, <http://www.ethanolrfa.org/CAairquality.pdf>

Position: Ethanol is as effective as MTBE in improving air quality without the risk of groundwater contamination contained in MTBE.

Rationale: *In a recent year-end update concerning smog, the California Air Resources Board touted the “dramatic improvements statewide compared to last year” after the state’s switch from MTBE to ethanol. The Board witnessed “the fewest (ozone) exceedance days ever in South Coast and San Joaquin Valley...No days exceeding standard in Bay Area and Sacramento Region...Lower peak concentrations in most areas of California.”*¹²

Position: Phase-out of MTBE and its replacement with ethanol will not result in a reduction of Federal Highway Trust Fund monies distributed to New Jersey.

Rationale: *Much of the federal highway funding disbursed to the states is based on the amount of federal gas tax remitted to the Federal Highway Trust Fund. Prior to January 1, 2005, the federal tax on ethanol was 5.2 cents per gallon less than regular gasoline. As a result, prior to January 1, 2005, consumption of ethanol decreased the amount of federal highway funds received. However, the 5.2-cent federal tax exemption on ethanol was eliminated.*¹³

Position: The experiences with ethanol in states such as New York, Connecticut and California have led other state governments to pursue ethanol as a preferable alternative.

Rationale: *Governors from 30 states recently sent a letter to President Bush and members of Congress urging them to increase the ethanol requirement in the pending federal Energy Bill, from requiring refiners to use 5 billion gallons of corn-based ethanol per year by 2012 to requiring them to use 8 billion gallons per year.*¹⁴

Position: Ethanol is not the only bio-fuel that can be used to both stretch the oil supply and help provide for a cleaner environment. Bio-diesel is made from virgin vegetable oils (often soybean oil) or from recycled sources. The recycled sources include cooking oils, which New Jersey has in abundance. Nearly one million gallons per month are disposed of in the state. Bio-diesel should see an expanded role in the state’s bio-fuels strategy.

Rationale: *Bio-diesel was the first alternative fuel to successfully complete and pass the testing regimen for such fuels under the Clean Air Act. It is currently in use by some NJ Transit and New Jersey Department of Transportation vehicles. The Medford Township School District reported that its use in school buses resulted in significant reduction in noxious fumes produced by idling buses.*

¹² Coalition of Northeastern Governors; California Air Resources Board, <http://ftp.arb.ca.gov/carbis/board/books/120904/04-11-6pres.pdf>

¹³ Fiscal note and correctional impact statement to Iowa State Senate File 96, prepared pursuant to Joint Rule 17 and pursuant to Section 2.56, Code of Iowa. Data from Fiscal Services Division, Legislative Services Agency.

¹⁴ Washington Times, Associated Press article, April 18, 2005.

Position: Like ethanol, bio-diesel can provide a new market for New Jersey's agricultural growers, as one of the primary stocks of bio-diesel is soybean oil. A large-scale market for soybeans as bio-diesel stock would significantly help New Jersey farmers who grow the crop.

Rationale: *New Jersey had 611 farms on which soybeans were grown, producing nearly 3.6 million bushels in 2002.¹⁵ A 2001 study by the USDA concluded that a nationwide increase of 200 million gallons per year of bio-diesel usage would increase total crop cash receipts by \$5.2 billion cumulatively by 2010, with an average net farm income increase of \$300 million per year, through which the average price of a bushel of soybeans would increase by an average 17 cents annually.¹⁶*

Position: While bio-diesel would cost more per gallon than current diesel fuel prices, costs of petroleum diesel are nearing the \$3-per-gallon break-even mark, at which the prices would be comparable. However, bio-diesel provides advantages over petroleum diesel in engine wear, reduced health risks and a marketable byproduct, glycerin.

Rationale: *The current cost of bio-diesel blended at 20-percent with petroleum diesel costs as much as 30 cents more per gallon than petroleum diesel alone, although it is still viable as an option in markets where a cleaner-burning, biodegradable fuel is required.¹⁷ Tests covering more than 30 million road miles using bio-diesel blends have demonstrated that performance, fuel mileage, drivability, start-up, power range and cold-weather performance characteristics of blends were similar to petroleum diesel.¹⁸*

Position: Even at its higher per-gallon cost, bio-diesel is economically preferable to pure petroleum diesel because its increased lubricity greatly improves engine and fuel injection equipment wear, reducing maintenance costs.

Rationale: *Petroleum diesel fuel in the United States exhibits some of the poorest lubricity found in the world, ahead of only Canada, Switzerland, Poland and Taiwan.¹⁹ Researchers concluded that adding bio-diesel to petroleum diesel significantly improved*

¹⁵ USDA, National Agricultural Statistics Service, 2002 Census of Agriculture, <http://www.nass.usda.gov/census/>

¹⁶ National Biodiesel Board, <http://www.naturalchoice.net/articles/biodiesel.htm>

¹⁷ "Economics of Bio-diesel Versus Petroleum," Canadian Renewable Fuels Association, <http://www.greenfuels.org/bioecon.html>

¹⁸ "On-Road Testing of Biodiesel – A Report of Past Research Activities," Peterson, C.L. and Reece, D., University of Idaho, http://www.uidaho.edu/bae/biodiesel/research/past_research.html

¹⁹ "Fuel Lubricity Reviewed," Lacey, P., Southwest Research Institute, and Howell, S., MARC-IV Consulting Inc., SAE Paper Number 982567, International Fall Fuels and Lubricants Meeting and Exposition, October 1998, http://www.biodiesel.org/pdf_files/fuelfactsheets/Lubricity.PDF

lubricity, and that “fuels consisting of methyl esters of soybean oil had excellent scuffing and adhesive wear resistance that exceeds those of the best conventional diesel fuels.”²⁰

Position: As New Jersey farmers are significant consumers of energy in their production of agricultural products, the use of solar and wind power, where applicable, should be encouraged in all farm operations. Systems and installation are readily available in the state.

Rationale: *New Jersey has developed a significant solar-energy installation industry, with 33 residential or commercial installers statewide.²¹ Farmers installing solar systems have reported favorable results, saving up to 15 percent on their electric bills.*

Position: Increases in efficiency and the current rise in traditional energy prices will make solar power even more attractive in the near future.

Rationale: *New technology pioneered by the U.S. Department of Energy will allow mass production of 25-kilowatt solar dishes at a cost of 25,000 by the end of 2006, a 90-percent reduction from the current cost. Combined with the recent spike in fossil fuel prices, the new technology will increase demand for solar systems.²²*

Position: Though feasible in limited areas of the state, wind turbines offer some of the best return on investment from renewable energy systems. New Jerseyans in the coastal and Northwestern reaches of the state should be encouraged to pursue these systems.

Rationale: *Improved technology has helped wind turbines become more efficient. In 2000, the Forest City, Iowa, school system installed a 600-kilowatt turbine that generates two-thirds of the power for a five-building complex. By 2001, the school system was saving \$60,000 a year on its electricity bill, and expected the turbine to last from 30 to 60 years with proper maintenance.²³*

²⁰ Ibid.

²¹ NJ Board of Public Utilities' New Jersey Clean Energy Program web site, at www.njcep.com/html/fav_list2-.html

²² “Another Dawn For Solar Power: Technical breakthroughs and high energy prices are rekindling the industry,” Port, O., BusinessWeek Online, September 2004.

²³ “Tilting Toward Windmills,” Arrandale, T., Governing Magazine, June 2001.